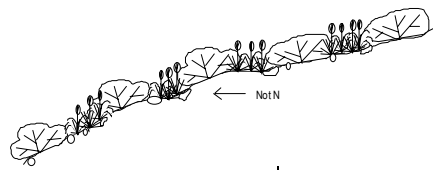


I. BIG SAGEBRUSH SHRUBLANDS (SS)

SS1. BIG SAGEBRUSH/MUTTONGRASS-DARK CLAY SOILS (ARTR2/POFE-ACPI2). Big sagebrush/muttongrass-pine needlegrass–Argiborolls, sometimes Pachic–Colluvial southerly to westerly slopes and summits, 8,000-10,200 ft



| | |
|------------------------------|--|
| NUMBER OF SAMPLES | 28, soil descriptions from 16 of these; 2 more that don't fit into a community type (total 30) |
| ELEVATION | 8,575 ft (8,000-9,220 ft); 2,614 m (2,430-2,810 m) |
| ASPECT | All, usually not northerly |
| LITHOLOGY | A wide variety, including tuff [22%], shale and sandstone [39%], breccia, gneiss, granite, basalt, and rhyolite |
| FORMATIONS' | A wide variety, including Km [17%], Taf - Tpl - Tbb [42%], Xfh, Kj dj, Tos, Kdb, Xg, Jmj, Jj, and Kd |
| LANDFORMS | Mostly soil creep slopes [52%], with also mesas and ridges [30%], and a few fan remnants, benches, and terraces |
| SLOPE POSITIONS | A wide variety, with no clear trend |
| SLOPE SHAPES | Mostly linear [73%] horizontally, and linear [73%] vertically. |
| SLOPE ANGLE | 13% (1-49%) |
| SOIL PARENT MATERIAL | Mostly colluvium [75%], some alluvium, colluvium over residuum, or residuum |
| COARSE FRAGMENTS | 13% (0-28%) cover on surface, 44% (7-67%) by volume in soil |
| SOIL DEPTH | 58 cm (31-128 cm); 23 in (12-51 in) |
| MOLLIC THICKNESS | 28 cm (0-51 cm); 11 in (0-20 in) |
| TEXTURE | Mostly clay loam, silty clay loam, and clay [67%] surface. Mostly clay, sandy clay, and clay loam [85%] subsurface |
| SOIL CLASSIFICATION | Almost all Argiborolls |
| TOTAL LIVE COVER | 113.5% (54-184%). |
| NO. SPECIES | 30 (15-46) |
| TOTAL LIVE COVER/NO. SPECIES | 3.8% (1.7-6.8%) |
| CLIMATE | Usually outside deep rainshadow. Montane climate, warm, dry, exposed to sun, moderately exposed to wind |
| WATER | No permanent water on or near sites |
| VEGETATION LAYERS | Typically four live layers |

Key to Community Types

1. At least one graminoid species with cover greater than sagebrush; total graminoid cover >65%; big sagebrush cover usually <35% **A**
1. Big sagebrush usually has greater cover than any graminoid species; total graminoid cover usually <65%; big sagebrush cover variable..... (2)
2. Total graminoid cover <20%..... **E**
2. Total graminoid cover >30%..... (3)
3. Total graminoid cover >40%..... **C**
3. Total graminoid cover <40%..... (4)

4. Pine needlegrass conspicuous (average >5% cover, always present); one or more individual sedge species with >10% cover; bare surface >25%..... **D**
4. Pine needlegrass inconspicuous (<5% cover) or absent; one or more individual grass species with >10% cover; bare surface <25%..... **B**

Description of Community Types

- A** *Grasses-big sagebrush-rabbitbrush* is characterized by graminoid cover >65%, sagebrush cover 15-30%, and graminoid production >500 lb/ac/yr. Most of the 6 plots had sagebrush cover between 15% and 35%, but one plot had 47%. Another plot had Sandberg bluegrass instead of muttongrass.
- B** *Forbs-big sagebrush-sedges-rabbitbrush* has graminoid cover between 30% and 40%, sagebrush cover <30%, and graminoid production <250 lb/ac/yr. Sedges and low forbs such as flowery phlox (PHMU3) and desert sandwort (ERCO24) are conspicuous.
- C** *Big sagebrush-grasses* has graminoid cover high but variable (45%-85%), sagebrush cover variable (10%-40%), and graminoid production variable (250-700 lb/ac/yr). Conspicuous grasses include several midseral natives such as bottlebrush squirreltail (ELEL5), needle-and-thread, and prairie junegrass (KOMA). The bluegrass species is usually muttongrass, but one plot had Sandberg bluegrass (POSE).
- D** *Big sagebrush-pine needlegrass-grasses* has graminoid cover 30-40%, sagebrush cover variable (11-45%), and graminoid production between 150 and 300 lb/ac/yr.
- E** *Big sagebrush-muttongrass-pine needlegrass* has graminoid cover <20%, sagebrush cover variable (20%-50%), and graminoid production <125 lb/ac/yr.

Plots Not Assigned to a Community Type

- Two plots had been disturbed and did not fit into any of the community types. One had been burned 10 years ago, and had high graminoid cover and production, but no sagebrush, and >25% cover by Douglas rabbitbrush (CHV18). The other had been seeded with crested wheatgrass (ACGR) 40-60 years ago, which accounted for 45-50% cover.

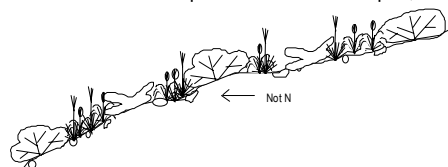
| Community Type | Elevation, ft Slope, % | Coarseness, % Depth, cm Mollic Depth, cm | Surface Coarse, % Bare, % Seral Stage | Cover, %: Trees Shrubs Graminoids Forbs | No. Species Total Live Cover, % TLC/NS, % | Prod. ¹ , lb/ac/yr Shrubs Gramin. Forbs |
|---|-------------------------------------|--|--|---|--|--|
| A. Grasses-big sagebrush-rabbitbrush | 8,900 (8,650-9,220) 8.3 (5-11) | 58 (35-67) 77 (44-128) 38 (23-51) | 16 (7-28) 9 (1-15) LS | 0 (0-0) 37 (28-48) 80 (65-115) 43 (19-72) | 35 (27-46) 160 (133-183) 4.9 (2.9-6.8) | 113-382 547-740 110-590 |
| B. Forbs-big sagebrush-sedges-rabbitbrush | 8,590 (8,480-8,700) 32.3 (16-49) | * * * | 10 (9-11) 11 (3-20) LM | 0 (0-0) 24 (14-33) 33 (32-34) 71 (64-78) | 34 (30-38) 127 (112-142) 3.7 (3.7-3.7) | 57-162 178-209 518-635 |
| C. Big sagebrush-grasses | 8,879 (8,260-10,160) 11.8 (1-30) | 48 (7-65) 43 (31-55) 31 (18-46) | 11 (0-26) 17 (6-38) LM | 0 (0-0) 41 (11-68) 55 (41-82) 29 (6-69) | 33 (15-44) 125 (85-174) 4.2 (2.5-9.9) | 42-639 283-657 35-571 |
| D. Big sagebrush-pine needlegrass-grasses | 8,358 (8,010-8,900) 9.2 (3-20) | 15 75 27 | 14 (6-25) 38 (28-50) MS | 0 (0-1) 38 (32-51) 34 (31-38) 13 (3-29) | 23 (15-27) 85 (78-98) 3.9 (2.9-5.7) | 141-431 167-254 18-168 |
| E. Big sagebrush-pine needlegrass | 8,217 (8,000-8,630) 13.7 (5-45) | 24 (7-46) 50 (31-65) 13 (0-23) | 10 (3-17) 29 (6-65) EM | 0 (0-1) 43 (31-73) 16 (14-20) 11 (3-29) | 28 (21-40) 70 (54-122) 2.6 (1.7-3.9) | 138-688 71-105 20-168 |

*. Unknown: measurements were not taken in this CT.

| | | |
|--------|--|--------------------------|
| | SHRUBS | |
| ARNO4 | Artemisia nova | black sagebrush |
| ARTR2 | Artemisia tridentata | big sagebrush |
| CHDE2 | Chrysothamnus depressus | dwarf rabbitbrush |
| CHVIP5 | Chrysothamnus viscidiflorus ssp. pumilus | green rabbitbrush |
| | GRAMINOIDS | |
| ACLE9 | Achnatherum lettermanii | Letterman needlegrass |
| ACPI2 | Achnatherum pinetorum | pine needlegrass |
| AGCR | Agropyron cristatum | crested wheatgrass |
| CAREX | Carex | sedge |
| CAFO3 | Carex foenea | silvertop sedge |
| CASTE3 | Carex stenophylla ssp. eleocharis | needleleaf sedge |
| ELEL5 | Elymus elymoides | bottlebrush squirreltail |
| HECO26 | Hesperostipa comata | needle-and-thread |
| KOMA | Koeleria macrantha | prairie junegrass |
| PASM | Pascopyrum smithii | western wheatgrass |
| POA | Poa | bluegrass |
| POFE | Poa fendleriana | muttongrass |
| POPR | Poa pratensis | Kentucky bluegrass |
| POSE | Poa secunda | Sandberg bluegrass |
| | FORBS | |
| ANPA4 | Antennaria parvifolia | smallleaf pussytoes |
| CALI4 | Castilleja linariifolia | Wyoming paintbrush |
| COUM | Comandra umbellata | bastard toadflax |
| ERCO24 | Eremogone congesta | desert sandwort |
| EREA | Erigeron eatonii | Eaton fleabane |
| ERSU2 | Erigeron subtrinervis | threenerve fleabane |
| PHHO | Phlox hoodii | Hood's phlox |
| PHMU3 | Phlox multiflora | flowery phlox |
| TRGY | Trifolium gymnocarpum | holly-leaf clover |
| WYMA | Wyethia x magna | mule's ears |

SS2. BITTERBRUSH-SAGEBRUSH/NEEDLEGRASS-DARK COARSE SOILS (PUTR2-ARTR2/HECO26-ACPI2).

Bitterbrush-big sagebrush/needle-and-thread-pine needlegrass–Haploborolls and Argiborolls with sandy subsoils–Somewhat protected colluvial slopes, < 9,700 ft



| | |
|------------------------------|--|
| NUMBER OF SAMPLES | 52, soil descriptions from 11 of these; 4 more that don't fit into a CT (total 56) |
| ELEVATION | 8,625 ft (7,980 - 9,660 ft); 2,629 m (2,430 - 2,950 m) |
| ASPECT | All, usually not northerly |
| LITHOLOGY | Mostly granite and gneiss [64%], sandstone and shale [27%], with breccia and schist composing the rest. |
| FORMATIONS ¹ | Xg [24%], Tos [19%], Xfh - Xg [33%], with Jj, Tpl, Km, Kjd, and Kjdj making the rest |
| LANDFORMS | Predominantly soil creep slopes [61%] and benches [11%], with others making the minor part |
| SLOPE POSITIONS | Primarily backslopes - lower backslopes - footslopes [85%] |
| SLOPE SHAPES | Primarily convex [67%] horizontally, evenly divided between linear [40%] and concave [40%] vertically. |
| SLOPE ANGLE | 15% (2 - 40%) |
| SOIL PARENT MATERIAL | Mostly colluvium [64%]; Coarse Fragments 17% (2 - 45%) cover on surface, 37% (0 - 73%) by volume in soil |
| SOIL DEPTH | 51 cm (25 - 107 cm); 20 in (9 - 42 in) |
| MOLLIC THICKNESS | 25 cm (0 - 61 cm) = 10 in (0 - 24 in) |
| TEXTURE | Mostly sandy loam and loamy sand [64%] surface, Predominantly loamy sand, sandy loam, and sandy clay loam [79%] subsurface |
| SOIL CLASSIFICATION | Haploborolls [54%] and Argiborolls [38%] |
| TOTAL LIVE COVER | 100.7% (31 - 206%). |
| NUMBER OF SPECIES | 24 (10-44) |
| TOTAL LIVE COVER/NO. SPECIES | 4.9% (1.4 - 14.7%) |
| CLIMATE | Usually outside deep rainshadow. Montane climate, Warm, dry, exposed to sun, moderately exposed to wind. |
| WATER | No permanent water on or near sites. |
| VEGETATION LAYERS | Typically four live layers |

Key to Community Types

1. Bitterbrush cover usually >20% (always >15%), big sagebrush cover usually 15-30%; total graminoid cover >50% **A**
1. Either bitterbrush cover <20% or big sagebrush cover >30%; total graminoid cover <70% . (2)
2. Bitterbrush cover <10%..... (3)
2. Bitterbrush cover >10%..... (5)
3. Total graminoid cover >50%, bare surface >10%..... **E**
3. Total graminoid cover <50%, bare surface <10%..... (4)
4. Total graminoid cover usually <20% (always <25%), vegetation sparse (total live cover <75%) **G**
4. Total graminoid cover usually >25% (always >20%), vegetation denser (total live cover usually >80%, always >65%) **F**
5. Total graminoid cover <30%..... **D**
5. Total graminoid cover >30%..... (6)
6. Bitterbrush cover >20% **B**
6. Bitterbrush cover <20% **C**

Description of Community Types

Communities with > 10% cover bitterbrush

- A *Bitterbrush-big sagebrush-muttongrass-grasses* is characterized by bitterbrush cover >20%, big sagebrush cover 15-30%, and total graminoid cover >50%. Graminoid production is >400 lb/ac/yr, and muttongrass is nearly always >20% cover.
- B *Bitterbrush-big sagebrush-muttongrass* has bitterbrush cover >20%, big sagebrush cover 20-35%, and total graminoid cover 40-50%. Graminoid production is 300-400 lb/ac/yr, and muttongrass is 10-20% cover. Total shrub cover is usually >55%.
- C *Big sagebrush-bitterbrush-grasses* has bitterbrush cover 10-20% and big sagebrush cover 15-30%; big sagebrush always has greater cover than bitterbrush. Total graminoid cover is 30-50% and graminoid production is 150-400 lb/ac/yr, with muttongrass cover variable, sometimes absent. Total shrub cover is <55%.
- D *Big sagebrush-bitterbrush-muttongrass* has bitterbrush cover of 10-20% and big sagebrush cover usually 20-50%, often >30%; big sagebrush always has greater cover than bitterbrush. Total graminoid cover is 10-30% and graminoid production is 50-150 lb/ac/yr, with muttongrass cover often <15%.

Communities with < 10% cover bitterbrush

- E *Big sagebrush-grasses-sparse bitterbrush* has bitterbrush cover 0.5-10%, big sagebrush cover usually >30% (always >25%), and total graminoid cover of 30-65%. Graminoid production is 350-600 lb/ac/yr, but muttongrass cover is usually <10%; two of the five plots had >20% of Sandberg bluegrass (POSE).
- F *Big sagebrush-grasses-sparse snowberry-sparse bitterbrush* has bitterbrush cover 0.5-10%, big sagebrush cover is usually >25% (always >15%), and total graminoid cover is 20-50%. Graminoid production is 100-400 lb/ac/yr; muttongrass cover is variable. One plot had Sandberg bluegrass dominant among graminoids.
- G *Big sagebrush-sparse bitterbrush* has bitterbrush cover of 0.5-10%, big sagebrush cover is variable (ranging from Trace to 30%), and total graminoid cover is <25%. Graminoid production is low, <125 lb/ac/yr; muttongrass is absent or <10% cover.

Plots Not Assigned to a Community Type

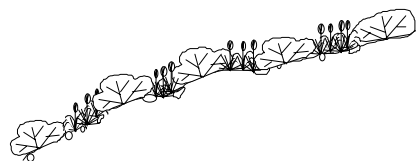
- Two plots with exotic smooth brome (BRIN7) and crested wheatgrass dominant among graminoids, apparently old crested wheatgrass seedings. Smooth brome may have been seeded also, or invaded following ground disturbance associated with seeding. Bitterbrush cover was <10% and big sagebrush cover was 25-35%. Total graminoid cover was 60-120%, but mostly exotic species.
 - One plot dominated by the exotic annual weed, cheatgrass (ANTE6), with significant cover from the early-seral natives blue grama (CHGR15) and needle-and-thread. Bitterbrush cover was 10% and sagebrush cover was 20%. Total graminoid cover was 70%, but was composed almost entirely of unpalatable species.
 - One plot dominated by the early-seral natives needle-and-thread and blue grama. Bitterbrush cover was 7%, and sagebrush cover was 18%, with a significant component of dead sagebrush (13% cover), cause of mortality unknown.
-

| Community Type | Elevation, ft Slope, % | Coarseness, % Depth, cm Mollic Depth, cm | Surface Coarse, % Bare, % Seral Stage | Cover, %: Trees Shrubs Graminoids Forbs | No. Species Total Live Cover, % TLC/NS, % | Prod. ¹ , lb/ac/yr Shrubs Gramin. Forbs |
|--|------------------------------------|---|--|---|--|--|
| A. Bitterbrush-big sagebrush-muttongrass- grasses | 8,943 (8,390-9,380) 19.1 (6-35) | 27 (0-54) 50 (0-93) 24 (7-32) | 11 (7-16) 8 (0-17) LS | 0 (0-1) 63 (41-106) 60 (51-76) 22 (3-62) | 25 (15-44) 146 (126-192) 7.1 (3.1-12.8) | 275-840 404-621 11-503 |
| B. Bitterbrush-big sagebrush-muttongrass | 8,924 (8,100-9,340) 12.0 (2-30) | 59 (45-73) 32 (28-35) 22 (18-25) | 10 (10-11) 8 (2-20) LM | 1 (0-2) 71 (57-106) 47 (41-52) 15 (3-47) | 25 (14-39) 133 (106-172) 6.4 (3.0-10.6) | 513-1592 316-483 20-58 |
| C. Big sagebrush- bitterbrush-grasses | 8,738 (8,030-9,320) 16.1 (6-30) | 55 (46-65) 38 (26-56) 30 (26-33) | 25 (15-37) 13 (3-25) LM-MS | 0 (0-2) 42 (32-55) 37 (30-49) 13 (4-33) | 24 (10-40) 92 (72-121) 4.4 (2.4-8.1) | 199-486 156-379 15-206 |
| D. Big sagebrush- bitterbrush-muttongrass | 8,369 (8,040-9,050) 19.6 (5-40) | 34 76 46 | 2 2 LM-MS | 0 (0-1) 54 (31-81) 19 (11-26) 6 (2-14) | 21 (13-30) 80 (50-120) 4.0 (2.5-6.7) | 133-743 57-135 9-60 |
| E. Big sagebrush- grasses-sparse bitterbrush | 8,960 (8,720-9,270) 5.2 (2-10) | 24 (10-39) 49 (36-61) 49 (36-61) | 15 (2-30) 17 (11-30) MS | 0 (0-0) 45 (34-63) 56 (50-70) 39 (17-71) | 28 (13-40) 140 (106-172) 6.7 (3.2-13.2) | 177-585 393-583 73-580 |
| F. Big sagebrush- grasses-sparse snowberry-sparse bitterbrush | 8,698 (8,000-9,660) 16.9 (2-30) | 37 (13-65) 62 (13-107) 11 (0-20) | 21 (4-45) 7 (4-9) EM | 1 (0-6) 42 (26-56) 34 (21-47) 26 (3-120) | 24 (12-42) 102 (64-205) 5.4 (2.2-14.7) | 103-499 106-354 11-802 |
| G. Big sagebrush- sparse bitterbrush | 8,252 (7,980-8,410) 13.1 (3-30) | 13 (13-13) 81 (81-81) 0 (0-0) | 36 (20-50) 25 (6-40) EM | 0 (0-1) 36 (21-57) 14 (3-24) 6 (3-9) | 23 (16-36) 57 (31-73) 2.7 (1.4-4.6) | 83-512 16-122 13-40 |

*. Unknown: measurements were not taken in this CT.

| | SHRUBS | |
|--------|-----------------------------------|--------------------------|
| ARNO4 | Artemisia nova | black sagebrush |
| ARTR2 | Artemisia tridentata | big sagebrush |
| CHDE2 | Chrysothamnus depressus | dwarf rabbitbrush |
| GUSA2 | Gutierrezia sarothrae | broom snakeweed |
| | GRAMINOIDS | |
| ACPI2 | Achnatherum pinetorum | pine needlegrass |
| AGCR | Agropyron cristatum | crested wheatgrass |
| CAREX | Carex | sedge |
| CAGE | Carex geophila | dryland sedge |
| CAOB4 | Carex obtusata | blunt sedge |
| CASTE3 | Carex stenophylla ssp. eleocharis | needleleaf sedge |
| CHGR15 | Chondrosium gracile | blue grama |
| ELEL5 | Elymus elymoides | bottlebrush squirreltail |
| HECO26 | Hesperostipa comata | needle-and-thread |
| KOMA | Koeleria macrantha | prairie junegrass |
| POA | Poa | bluegrass |
| POFE | Poa fendleriana | muttongrass |
| POSE | Poa secunda | Sandberg bluegrass |
| | FORBS | |
| ALLIU | Allium | onion |
| ERCO24 | Eremogone congesta | desert sandwort |
| ERSU11 | Eriogonum subalpinum | sulfurflower |
| PHMU3 | Phlox multiflora | flowery phlox |
| TAOF | Taraxacum officinale | common dandelion |
| WYMA | Wyethia x magna | mule's ears |

SS3. BIG SAGEBRUSH/OATGRASS-ARIZONA FESCUE-DARK CLAY SOILS (ARTR2/DAPA2-FEAR2). Big sagebrush/Parry oatgrass-Arizona fescue-Argiborolls-Gentle to moderate flats and slopes, 8,900-10,200 ft



| | |
|------------------------------|---|
| NO. SAMPLES | 16; soil descriptions from 11 of these; all fit into community types (total 16) |
| ELEVATION | 9,477 ft (8,990 - 10,110 ft); 2,888 m (2,740 - 3,080 m) |
| ASPECT | All, usually not northerly |
| LITHOLOGY | Primarily igneous, with Tuff [35%] mostly Fish Canyon Formation, Rhyolitic Lava [18%], Basalt [18%] and Andesite [12%] leading. Sedimentaries are clearly minor |
| FORMATIONS' | Mostly Igneous: Taf [35%] and Tpl-Tbb-Tigl [47%] |
| LANDFORMS | Soil creep slopes [46%] and mesas [31%], other landforms minor |
| SLOPE POSITIONS | Lower backslopes, backslopes, and footslopes [73%] predominate |
| SLOPE SHAPES | Equally convex [45%] and linear [45%] horizontally, Mainly linear [75%] vertically. |
| SLOPE ANGLE | 19% (6 - 47%) |
| SOIL PARENT MATERIAL | Mostly colluvial in the main [92%], with 50% having "Slope Alluvium" over that |
| COARSE FRAGMENTS | 17% (0-47%) cover on surface, 41% (16-65%) by volume in soil |
| SOIL DEPTH | 56 cm (37 - 81 cm); 22 in (14 - 32 in) |
| MOLLIC THICKNESS | 6 cm (6 - 59 cm); 10 in (2 - 24 in) |
| TEXTURE | Mostly loam - clay loam - clay [73%] surface; mostly sandy clay loam - clay - clay loam [75%] subsurface |
| SOIL CLASSIFICATION | Mostly Argiborolls [85%], mostly deep or moderately deep [83%] |
| NUMBER OF SPECIES | 33 (26 - 41) |
| TOTAL LIVE COVER | 141.1% (94 - 208%). |
| TOTAL LIVE COVER/NO. SPECIES | 4.3% (2.9 - 5.8%) |
| CLIMATE | Usually in deep or moderate rainshadow. Montane climate, warm, dry, exposed to sun, moderately exposed to wind |
| WATER | No permanent water on or near sites |
| VEGETATION LAYERS | Typically four live layers: |

Key to Community Types

1. Total graminoid cover >95%. Parry oatgrass prominent, 10-75% cover, often >35%. Surface coarse fragments <10% cover, bare soil <15% cover. Sedges (CAREX) prominent, 10-50% cover..... **A**
1. Total graminoid cover <95%. Parry oatgrass usually present but not prominent, always <35%, usually <15% cover. Surface coarse fragments usually >10%, bare soil usually >10% cover. Sedges usually aggregate <35% cover..... (2)
2. Total graminoid cover 80-95%. Parry oatgrass and Arizona fescue prominent, total of the two usually >20%. Total sedge cover usually >25%, always >10%. Surface coarse fragments <20% cover **B**
2. Total graminoid cover <80%. Parry oatgrass or Arizona fescue prominent or not, usually not both. Total sedge cover usually 0-10%, occasionally >15%. Surface coarse fragments usually >20% cover, always >17% (3)
3. Total graminoid cover 60-80%, Arizona fescue prominent, 10-50% cover, Parry oatgrass present but <10% cover. Mountain muhly or muttongrass >10%. Surface coarse fragments 20-30%..... **C**
3. Total graminoid cover 40-60%. Sedge cover usually <5%. Surface coarse fragments 15-50% **D**

Description of Ecological Types

- A** *Parry oatgrass-big sagebrush-Arizona fescue-junegrass* is characterized by total graminoid cover >95%, and graminoid production >1,200 lb/ac/yr. Parry oatgrass is prominent, with 10-75% cover, as is Arizona fescue at 10-25% cover. Prairie junegrass (KOMA) and one of several sedge species (CASTE3 or CAO4) are often conspicuous. Cover by surface coarse fragments is <10% and bare soil is <15%.
- B** *Big sagebrush-Arizona fescue-Parry oatgrass* has total graminoid cover 80-95%, and graminoid production of 1,000-1,200 lb/ac/yr. Arizona fescue and Parry oatgrass are about equal in cover; one plot had >10% cover of mountain muhly; two plots had >15% cover of junegrass. Sedge species are often prominent, with >20% cover. Cover by surface coarse fragments is 2-20% and bare soil 3-26%.
- C** *Arizona fescue-big sagebrush-Parry oatgrass* has total graminoid cover 60-80%, and graminoid production of 700-900 lb/ac/yr. Arizona fescue is prominent with >10% cover, but Parry oatgrass is not, with <5% cover. Two plots had >15% cover of mountain muhly. Cover by surface coarse fragments is >20%, and bare soil is 8-19%.
- D** *Big sagebrush-Arizona fescue-junegrass* has total graminoid cover <60%, and graminoid production of 400-700 lb/ac/yr. Arizona fescue is prominent (5-30% cover), usually more than Parry oatgrass (2-20% cover); one plot had >10% cover of mountain muhly, and two plots have >10% cover of junegrass. Another two plots had >15% cover of slimstem muhly (MUFI). Cover by surface coarse fragments is considerable (17-47%) and bare soil is usually noticeable (5-28%).

| Community Type | Elevation, ft Slope, % | Coarseness, % Depth, cm Mollic Depth, cm | Surface Coarse, % Bare, % Seral Stage | Cover, %: Trees Shrubs Graminoids Forbs | No. Species Total Live Cover, % TLC/NS, % | Prod. ¹ , lb/ac/yr Shrubs Gramin. Forbs |
|--|--------------------------------------|--|--|---|--|--|
| A. Parry oatgrass-big sagebrush-Arizona fescue-junegrass | 9,378 (8,990-9,740) 16.0 (6-27) | 30 (26-32) 69 (54-78) 27 (19-41) | 4 (0-10) 9 (3-13) PN | 0 (0-0) 28 (20-36) 113 (98-142) 36 (27-57) | 36 (27-41) 177 (155-208) 4.9 (4.2-5.8) | 30-173 1262-1448 234-454 |
| B. Big sagebrush-Arizona fescue-Parry oatgrass | 9,291 (8,990-9,650) 11.6 (9-21) | 38 (16-64) 61 (50-78) 25 (12-41) | 7 (1-18) 12 (3-26) LM | 0 (0-0) 34 (20-58) 88 (82-92) 37 (16-61) | 36 (31-43) 158 (127-186) 4.4 (3.9-4.9) | 29-782 1045-1196 140-473 |
| C. Arizona fescue-big sagebrush-Parry oatgrass | 9,683 (9,470-10,110) 23.0 (20-27) | 45 (32-65) 42 (38-50) 19 (15-27) | 25 (21-29) 15 (8-19) LS | 0 (0-0) 23 (20-26) 66 (63-70) 39 (24-49) | 31 (26-35) 128 (118-135) 4.2 (3.4-5.1) | 28-37 704-836 213-415 |
| D. Big sagebrush-Arizona fescue-junegrass | 9,531 (9,220-10,000) 24.4 (11-47) | 48 (30-63) 54 (37-81) 30 (6-59) | 30 (17-47) 17 (5-28) LM | 0 (0-0) 32 (12-53) 56 (50-60) 21 (18-22) | 30 (26-35) 109 (94-127) 3.7 (2.9-4.5) | 18-628 464-647 155-197 |

| | SHRUBS | |
|--------|-----------------------------------|--------------------|
| ARTR2 | Artemisia tridentata | big sagebrush |
| | GRAMINOIDS | |
| ACPI2 | Achnatherum pinetorum | pine needlegrass |
| CAFI | Carex filifolia | threadleaf sedge |
| CAFO3 | Carex foenea | silvertop sedge |
| CAOB4 | Carex obtusata | blunt sedge |
| CASTE3 | Carex stenophylla ssp. eleocharis | needleleaf sedge |
| DAPA2 | Danthonia parryi | Parry oatgrass |
| FEAR2 | Festuca arizonica | Arizona fescue |
| FEID | Festuca idahoensis | Idaho fescue |
| KOMA | Koeleria macrantha | prairie junegrass |
| MUFI | Muhlenbergia filiculmis | slimstem muhly |
| MUFI2 | Muhlenbergia filiformis | pullup muhly |
| MUMO | Muhlenbergia montana | mountain muhly |
| POFE | Poa fendleriana | muttongrass |
| PONEI2 | Poa nemoralis ssp. interior | interior bluegrass |

| | FORBS | |
|--------|-------------------------------------|---------------------|
| AMLA6 | Amerosedum lanceolatum | yellow stonecrop |
| ANRO2 | Antennaria rosea | rose pussytoes |
| ANRO3 | Antennaria rosulata | Kaibab pussytoes |
| ASMIO | Astragalus miser var. oblongifolius | weedy milkvetch |
| ERFE3 | Eremogone fendleri | desert sandwort |
| ERSU2 | Erigeron subtrinnervis | threenerve fleabane |
| ERTR19 | Erythrocoma triflora | prairie smoke |
| LALE2 | Lathyrus leucanthus | aspen peavine |
| LUSE4 | Lupinus sericeus | silky lupine |
| ORLU2 | Orthocarpus luteus | yellow owl-clover |
| OXLA3 | Oxytropis lambertii | Lambert crazyweed |
| PENST | Penstemon | beard tongue |
| PHMU3 | Phlox multiflora | flowery phlox |
| SOMI2 | Solidago missouriensis | Missouri goldenrod |

SS4. **BIG SAGEBRUSH/ARIZONA FESCUE-DARK SOILS** (ARTR2/FEAR2). Big sagebrush/Arizona fescue–Mollisols with or without an Argillic horizon–Gentle to moderate summits, shoulders, and backslopes, 8,600–10,200 ft



| | |
|------------------------------|--|
| NUMBER OF SAMPLES | 25, soil descriptions from 24; 1 that does not fit into a CT (total 26) |
| ELEVATION | 9,226 ft (8,620 - 10,120 ft) = 2,812 m (2,620 - 3,390 m) |
| ASPECT | All, usually not northerly |
| LITHOLOGY | Predominantly igneous, with Tuff and Welded Tuff [49%], Granite and Breccia [23%], and Shale [9%]; others were minor. |
| FORMATIONS' | Predominantly Taf [47%], Tpl [16%], Xg [6%], and Km [9%]; others were minor |
| LANDFORMS | Mostly soil creep slopes [38%], mesas [28%], and ridges [19%]. Others were minor |
| SLOPE POSITIONS | Mostly between summits, shoulders, and backslopes [83%] |
| SLOPE SHAPES | Linear [52%] to convex [30%] horizontally, Linear [56%] to convex [33%] vertically |
| SLOPE ANGLE | 18° (0 - 51°) |
| SOIL PARENT MATERIAL | Mostly colluvium [54%] and colluvium over residuum [12%], with some residuum [19%]. Others were minor |
| COARSE FRAGMENTS | 24% (0 - 60%) cover on surface, mostly gravelly, very gravelly, or extremely gravelly [78%]. Coarse fragments 53% (16 - 88%) by volume in soil. |
| SOIL DEPTH | 63 cm (27 - 140 cm) = 25 in (10 - 55 in). |
| MOLLIC THICKNESS | 21 cm (0 - 48 cm) = 8 in (0 - 19 in). |
| TEXTURE | A wide variety of textures on the surface, including clay loam [24%], sandy loam [21%], loam [15%] and sandy clay loam [12%]. Also a wide variety of subsurface textures, including sandy clay loam [29%], clay [29%], clay loam [15%], and sandy clay [9%]. |
| SOIL CLASSIFICATION | Argiborolls [63%] and Haploborolls [17%] |
| TOTAL LIVE COVER | 111.7% (60 - 175%) |
| NUMBER OF SPECIES | 31 (21 - 38) |
| TOTAL LIVE COVER/NO. SPECIES | 3.6% (2.3 - 4.8%) |
| CLIMATE | Usually in moderate rainshadow. Upper Montane climate, cool, exposed to sun, moderately exposed to wind. |
| WATER | No permanent water on or near sites |
| VEGETATION LAYERS | Typically four live layers |

Key to Community Types

1. Total graminoid cover usually >85% (always >80%), big sagebrush cover 20-25%, Arizona fescue cover >35% **A**
1. Total graminoid cover usually <80% (always <85%), big sagebrush cover usually either >25% or <20%, Arizona fescue usually <35% (2)
2. Total graminoid cover >55% (55-85%), big sagebrush cover sometimes 20-25%, Arizona fescue cover sometimes >30% (3)
2. Total graminoid cover <55% (20-55%), big sagebrush cover never 20-25%, Arizona fescue cover never >30% (4)
3. Total graminoid cover >65% (65-85%). Junegrass sometimes not present, usually <10% cover in any case **B**
3. Total graminoid cover <65% (55-65%). Junegrass always present, always >10% cover **C**
4. Total graminoid cover <35% **F**
4. Total graminoid cover >40% (5)
5. Arizona fescue cover >10% **D**
5. Arizona fescue cover <10% **E**

Description of Community Types

- A** *Arizona fescue-big sagebrush-muttongrass* is characterized by total graminoid cover >75%, big sagebrush cover of 20-25%, and Arizona fescue cover >35%. Graminoid production is >1,000 lb/ac/yr. Sedges (CAREX) may or may not be conspicuous. One of the four plots had >15% cover of mountain muhly. Junegrass was always present, and two plots had >10% cover of junegrass. One plot had >10% cover of Rocky Mountain fescue (FESA).
- B** *Big sagebrush-Arizona fescue* has total graminoid cover of 65-85%, big sagebrush cover of 20-45%, and Arizona fescue cover of 5-40%. Three plots with total graminoid cover of 75-85% had big sagebrush cover of >25%. Junegrass was sometimes absent, and usually <5% cover. Mountain muhly was >20% cover in three plots.
- C** *Big sagebrush-junegrass-Arizona fescue* has total graminoid cover of 55-70%, big sagebrush cover is either <20% or >25%, and Arizona fescue cover is usually >10% (5-25%). Junegrass is always present and >10%. Muttongrass is always present, but variable in cover (T-20%). One plot had >15% cover of mountain muhly.
- D** *Big sagebrush-Arizona fescue-junegrass* has total graminoid cover of 40-45% and Arizona fescue cover is always >10%. Junegrass is always present (2-20% cover). Muttongrass is sometimes absent. One plot had >15% cover of mountain muhly.
- E** *Big sagebrush-black sagebrush-muttongrass-Arizona fescue* has total graminoid cover of 40-55% and Arizona fescue cover <10%. Black sagebrush (ARNO4) is always present, but is always clearly subdominant to big sagebrush. Muttongrass is always present (2-25% cover). Junegrass is sometimes absent; in one plot junegrass was >15% cover. One plot had >10% cover of slimstem muhly.
- F** *Big sagebrush-muttongrass* has total graminoid cover <40%. In two of three plots, Arizona fescue is >10%; in the third plot, Arizona fescue is absent, but mountain muhly is >10% cover. Muttongrass is always present (4-15% cover). Junegrass is usually absent.

Plot Not Assigned to a Community Type

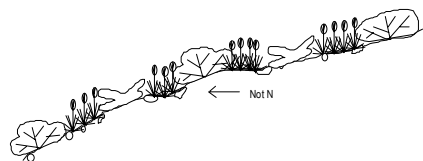
- One plot is somewhat like A, but has 49% cover of big sagebrush, total graminoid cover of 114%, Arizona fescue cover of 32%, and blunt sedge (CAOB) cover of 46%. Productivity is far above the range for the other plots in this type.

| Community Type | Elevation, ft Slope, % | Coarseness, % Depth, cm Mollic Depth, cm | Surface Coarse, % Bare, % Seral Stage | Cover, %: Trees Shrubs Gramin. Forbs | No. Species Total Live Cover, % TLC/NS, % | Prod. ¹ , lb/ac/yr Shrubs Gramin. Forbs |
|---|-------------------------------------|--|---|---|--|--|
| A. Arizona fescue-big sagebrush-muttongrass-junegrass | 9,530 (9,380-9,760) 16.0 (0-40) | 34 (16-58) 103 (51-140) 42 (34-48) | 10 (5-15) 11 (9-13) LM | 0 (0-0) 25 (21-29) 102 (93-116) 35 (30-40) | 35 (33-36) 162 (153-174) 4.6 (4.4-4.8) | 30-42 1204-1410 262-354 |
| B. Muttongrass-big sagebrush-Arizona fescue-junegrass | 8,871 (8,640-9,102) 14.5 (11-18) | 52 (52-52) 49 (49-49) 41 (41-41) | 15 (13-18) 23 (13-34) LM | 0 (0-0) 45 (35-55) 79 (74-83) 21 (19-24) | 39 (34-43) 145 (137-153) 3.8 (3.6-4.0) | 153-687 922-1072 166-207 |
| C. Big sagebrush-Arizona fescue | 9,347 (8,754-9,960) 22.3 (10-51) | 55 (18-77) 50 (31-78) 19 (8-35) | 18 (1-42) 15 (1-29) MS-LM | 0 (0-0) 37 (23-58) 72 (59-81) 22 (0-45) | 33 (26-38) 130 (103-160) 4.0 (2.7-4.8) | 33-781 634-1031 0-386 |
| D. Big sagebrush-junegrass-Arizona fescue-muttongrass | 9,113 (8,700-9,760) 23.5 (11-41) | 47 (40-53) 87 (52-137) 9 (0-18) | 35 (5-55) 12 (7-14) MS | 0 (0-0) 27 (18-37) 60 (57-65) 13 (6-19) | 29 (21-33) 100 (81-113) 3.5 (3.3-3.9) | 26-201 595-751 53-168 |
| E. Big sagebrush-Arizona fescue-junegrass | 9,218 (8,730-10,120) 13.8 (3-31) | 72 (62-88) 54 (49-60) 16 (2-30) | 35 (22-60) 10 (4-15) MS | 0 (0-0) 36 (13-56) 39 (26-43) 18 (4-28) | 33 (26-45) 92 (79-101) 2.9 (2.2-3.6) | 18-721 123-346 33-246 |
| F. Big sagebrush-muttongrass-sparse Arizona fescue | 9,000 (8,630-9,550) 4.2 (2-7) | 38 (19-60) 64 (34-91) 22 (19-26) | 17 (5-34) 26 (4-35) EM | 0 (0-0) 42 (31-57) 45 (40-52) 12 (6-20) | 31 (23-38) 99 (79-123) 3.2 (2.8-3.9) | 63-732 290-498 49-176 |
| G. Big sagebrush-sparse | 9,007 (8,620-9,720) 17.2 (7-37) | 64 (43-81) 40 (27-51) 11 (2-28) | 25 (3-48) 22 (7-33) ES-EM | 0 (0-0) 27 (25-28) 32 (27-35) 26 (2-67) | 30 (25-33) 85 (61-122) 2.8 (2.3-3.7) | 36-40 128-212 20-492 |

*. Unknown: measurements were not taken in this CT.

| | | |
|--------|-----------------------------------|-----------------------|
| | SHRUBS | |
| ARTR2 | Artemisia tridentata | big sagebrush |
| | GRAMINOIDS | |
| ACHY | Achnatherum hymenoides | Indian ricegrass |
| ACPI2 | Achnatherum pinetorum | pine needlegrass |
| BRPO5 | Bromopsis porteri | nodding brome |
| CAFI | Carex filifolia | threadleaf sedge |
| CAFO3 | Carex foenea | silvertop sedge |
| CAOB4 | Carex obtusata | blunt sedge |
| CASTE3 | Carex stenophylla ssp. eleocharis | needleleaf sedge |
| CHGR15 | Chondrosum gracile | blue grama |
| FEAR2 | Festuca arizonica | Arizona fescue |
| FESA | Festuca saximontana | Rocky Mountain fescue |
| HECO26 | Hesperostipa comata | needle-and-thread |
| KOMA | Koeleria macrantha | prairie junegrass |
| MUFI | Muhlenbergia filiculmis | slimstem muhly |
| MUMO | Muhlenbergia montana | mountain muhly |
| POFE | Poa fendleriana | muttongrass |
| | FORBS | |
| EREA | Erigeron eatonii | Eaton fleabane |
| ERSU2 | Erigeron subtrinervis | threenerve fleabane |
| ERSU11 | Eriogonum subalpinum | sulfurflower |
| LALE2 | Lathyrus leucanthus | aspen peavine |
| LUAR3 | Lupinus argenteus | silvery lupine |
| OXLA3 | Oxytropis lambertii | Lambert crazyweed |
| PHHO | Phlox hoodii | Hood's phlox |
| PHMU3 | Phlox multiflora | flowery phlox |

SS5. BITTERBRUSH-SAGEBRUSH/OATGRASS-ARIZONA FESCUE-LIGHT-COLORED SOILS-NORTHERLY
(PUTR2-ARTR2/DAPA2-FEAR2). Bitterbrush-big sagebrush/Parry oatgrass-Arizona fescue-Haplustalfs-
Northerly gentle to moderate backslopes and toeslopes, 8,700-9,000 ft



| | |
|------------------------------|--|
| NUMBER OF SAMPLES | 7, soil descriptions from 4 of these (total 7) |
| ELEVATION | 8,839 ft (8,700 - 8,960 ft) = 2,694 m (2,650 - 2,730 m) |
| ASPECT | Usually northerly |
| LITHOLOGY | Almost all igneous, with Breccia, Tuff, Welded Tuff, Granite, and Rhyolitic Lava making up [80%] of the samples |
| FORMATIONS¹ | Tpl - Xg - Taf [80%], Km [20%] |
| LANDFORMS | All soil creep slopes [100%] |
| SLOPE POSITIONS | Backslopes and lower backslopes [83%] and toeslopes |
| SLOPE SHAPES | Convex [86%] horizontally, Linear [100%] vertically. |
| SLOPE ANGLE | 16% (8-23%) |
| SOIL PARENT MATERIAL | All colluvium [100%] |
| COARSE FRAGMENTS | 26% (7 - 43%) cover on surface, all gravelly or very gravelly. Coarse fragments are 43% (26 - 66%) by volume in soil |
| SOIL DEPTH | 66 cm (40 - 106 cm); 26 in (15 - 42 in) |
| MOLLIC THICKNESS | 14 cm (8 - 26 cm); 5 in (3 - 10 in) |
| TEXTURE | Loam and clay loam surface, Clay, sandy clay loam, and sandy clay subsurface |
| SOIL CLASSIFICATION | Haplustalfs [50%] or Argiborolls [50%] |
| TOTAL LIVE COVER | 128.7% (106-165%). |
| NUMBER OF SPECIES | 37 (30-46) |
| TOTAL LIVE COVER/NO. SPECIES | 3.5 (2.9-4.4) |
| CLIMATE | Usually in moderate rainshadow. Upper Montane climate, cool, exposed to sun, moderately exposed to wind |
| WATER | No permanent water on or near sites |
| VEGETATION LAYERS | Typically four live layers |

Key to Community Types

1. Total graminoid cover >75%..... **A**
2. Total graminoid cover <70% **B**

Description of Community Types

The seven plots are divided arbitrarily into two “community types” based only on graminoid cover and production, but actually each of the seven is unique. Except for plots numbered 5 and 6 below, they do not cluster well as community types.

A *Oatgrass-pussytoes-junegrass-big sagebrush-bitterbrush*. These three plots are dominated by grasses and forbs, with small amounts of big sagebrush and bitterbrush. Total graminoid cover is >75% and graminoid production is >1,000 lb/ac/yr. All three plots include >15% cover by sedge species (CAREX), and all have <10% cover of Arizona fescue. Two of the plots have <5% cover sagebrush and bitterbrush; the other has about 25% cover of sagebrush, and about 8% bitterbrush. All three plots include Parry oatgrass, but only two have >10% cover. Two of the plots have >20% cover of Sandberg bluegrass; muttongrass is uncommon throughout the ecological type. Two of the plots have >10% cover of rose pussytoes (ANRO2). One of the plots has >15% cover of snakeweed (GUSA2). In order of species dominance, the three plots are called:

1. Sagebrush-bluegrass-sedge-junegrass (KOMA)-oatgrass
2. Snakeweed-sedge-bluegrass-junegrass-needle-and-thread (HECO26)
3. Sedge-pine needlegrass (ACPI2)-oatgrass

B *Big sagebrush-Arizona fescue-oatgrass-junegrass*. These four plots are dominated by big sagebrush, with varying amounts of bitterbrush. Total graminoid cover is <70% and graminoid production is <800 lb/ac/yr in all four. All four plots have >10% cover of Arizona fescue, and three of the four have >10% cover of junegrass. Only one plot has >30% cover of Parry oatgrass; the other three have <10%. Only one plot has >30% of sedge species; the other three have <10%. None of the plots includes much bluegrass. In order of species dominance, the four plots are called:

4. Sagebrush-bitterbrush-sedge-Arizona fescue

5,6. Sagebrush-Arizona fescue-junegrass

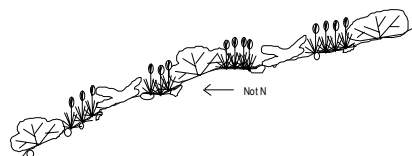
7. Sagebrush-oatgrass-junegrass-Arizona fescue

| Community Type | Elevation, ft Slope, % | Coarseness, % Depth, cm Mollic Depth, cm | Surface Coarse, % Bare, % Seral Stage | Cover, %: Trees Shrubs Graminoids Forbs | No. Species Total Live Cover, % TLC/NS, % | Prod. ¹ , lb/ac/yr Shrubs Gramin. Forbs |
|---|-------------------------------------|--|--|---|--|--|
| A. Oatgrass-pussytoes-junegrass-big sagebrush-bitterbrush | 8,817 (8,720-8,940) 15.3 (12-18) | * * * | 17 (7-30) 22 (13-35) PN-LS | 0 (0-0) 26 (6-49) 85 (81-87) 22 (14-34) | 36 (30-43) 133 (107-165) 3.7 (3.6-3.8) | 9-528 1042-1132 115-303 |
| B. Big sagebrush-Arizona fescue-oatgrass-junegrass | 8,855 (8,700-8,960) 15.7 (8-23) | 43 (26-66) 66 (40-106) 14 (8-26) | 32 (22-43) 16 (7-23) LM | 0 (0-0) 42 (32-57) 60 (50-67) 24 (14-35) | 37 (31-46) 126 (107-141) 3.4 (2.9-4.4) | 88-756 462-779 116-308 |

*. Unknown: measurements were not taken in this CT.

| | SHRUBS | |
|--------|--|-----------------------|
| ARTR2 | Artemisia tridentata | big sagebrush |
| CHVIP5 | Chrysothamnus viscidiflorus ssp. pumilus | green rabbitbrush |
| GUSA2 | Gutierrezia sarothrae | broom snakeweed |
| LEPU | Leptodactylon pungens | granite gilia |
| PUTR2 | Purshia tridentata | antelope bitterbrush |
| | GRAMINOIDS | |
| ACNE9 | Achnatherum nelsonii | Nelson's needlegrass |
| ACPI2 | Achnatherum pinetorum | pine needlegrass |
| CAFI | Carex filifolia | threadleaf sedge |
| CAPEH | Carex pensylvanica ssp. heliophila | sun sedge |
| CASTE3 | Carex stenophylla ssp. eleocharis | needleleaf sedge |
| DAPA2 | Danthonia parryi | Parry oatgrass |
| FEAR2 | Festuca arizonica | Arizona fescue |
| FESA | Festuca saximontana | Rocky Mountain fescue |
| HECO26 | Hesperostipa comata | needle-and-thread |
| KOMA | Koeleria macrantha | prairie junegrass |
| POFE | Poa fendleriana | muttongrass |
| POSE | Poa secunda | Sandberg bluegrass |
| POTR | Poa tracyi | Tracy bluegrass |
| | FORBS | |
| ANRO2 | Antennaria rosea | rose pussytoes |
| ASMIO | Astragalus miser var. oblongifolius | weedy milkvetch |
| EREA | Erigeron eatonii | Eaton fleabane |
| TRGY | Trifolium gymnocarpum | holly-leaf clover |

SS6. **BITTERBRUSH-SAGEBRUSH/ARIZONA FESCUE–DARK SOILS** (PUTR2-ARTR2/FEAR2). Bitterbrush-big sagebrush/Arizona fescue–Argiborolls and Haploborolls–Non-northerly summits, shoulders, and backslopes, 8,000-9,600 ft



| | |
|-------------------------------------|--|
| NUMBER OF SAMPLES | 37, soil descriptions from 18 of these (total 37) |
| ELEVATION | 8,780 ft (8,050 - 9,600 ft) = 2,676 m (2,450 - 2,930 m) |
| ASPECT | All, usually not northerly |
| LITHOLOGY | All igneous, mostly welded tuff and tuff [63%]; not yet found on sedimentary lithologies |
| FORMATIONS ¹ | Mostly Taf [57%] and most of that Fish Canyon Tuff. A variety of other igneous formations |
| LANDFORMS | Mostly soil creep slopes [50%], with some ridges and mesas [40%] |
| SLOPE POSITIONS | Mostly upper backslopes, backslopes, and shoulders [73%] |
| SLOPE SHAPES | Linear [42%] to Convex [37%] horizontally; Linear [53%] to convex [37%] vertically. |
| SLOPE ANGLE | 21% (3-50%) |
| SOIL PARENT MATERIAL | Mostly colluvium over residuum [42%] or colluvium [37%] |
| COARSE FRAGMENTS | 24% (2 - 67%) cover on surface, almost always gravelly or very gravelly, often with cobbles and stones as well. Coarse fragments are 57% (11 - 86%) by volume in soil |
| SOIL DEPTH | 75 cm (32 - 182 cm); 30 in (12 - 72 in) |
| MOLLIC THICKNESS | 23 cm (0 - 54 cm); 9 in (0 - 21 in) |
| TEXTURE | Mostly sandy surfaces, with sandy clay loam [27%] and sandy loam [18%] predominating. Mostly sandy clay subsurfaces, sandy clay loam [29%] and sandy clay [20%] predominating. |
| SOIL CLASSIFICATION | Mostly Argiborolls [75%] |
| TOTAL LIVE COVER | 112.6% (60 - 217%). |
| NUMBER OF. SPECIES | 28 (12 - 44) |
| TOTAL LIVE COVER/ NUMBER OF SPECIES | 4.4% (2.1 - 10.2%) |
| CLIMATE | Usually in moderate rainshadow. Upper Montane climate, cool, exposed to sun, moderately exposed to wind |
| WATER | No permanent water on or near sites |

Key to Community Types

1. Total graminoid cover >90%**A**
1. Total graminoid cover <80% (2)
2. Total graminoid cover 75-80%.....**B**
2. Total graminoid cover <75% (3)
3. Total graminoid cover 65-75% **C**
3. Total graminoid cover <65% (4)
4. Total graminoid cover 50-65%..... **D**
4. Total graminoid cover <50%..... (5)
5. Total graminoid cover >45%; if not, then bitterbrush cover >20%**E**
5. Total graminoid cover <40%; if not, then bitterbrush cover <15% **F**

Description of Community Types

- A** *Big sagebrush-grasses-bitterbrush* is characterized by total graminoid cover >90% and graminoid production >1,100 lb/ac/yr. The bulk of graminoid cover and production are by sun sedge (CAPEH), blunt sedge (CAOB4), Arizona fescue, junegrass (KOMA), mountain muhly (MUMO), or muttongrass (POFE). Needlegrasses (*Achnatherum* spp.) are prominent and usually >10%. Two of the three plots had high cover of sagebrush, Arizona fescue, muttongrass, and junegrass; the other plot had high cover of bitterbrush, mountain muhly, sun sedge, and needlegrasses.
- B** *Bitterbrush-big sagebrush-grasses* has total graminoid cover 75-90% and graminoid production 900-1,100 lb/ac/yr. The graminoids making up the bulk of cover and production are one or more of: dryland sedge (CAGE), needleleaf sedge (CASTE3), Arizona fescue, mountain muhly, or muttongrass. Junegrass was always present, but was always <5% cover. Bitterbrush cover was often >20% (always >10%), and sagebrush cover was <30%.
- C** *Big sagebrush-bitterbrush-muttongrass-Arizona fescue* has total graminoid cover 65-75% and graminoid production 750-900 lb/ac/yr. Muttongrass is always present and prominent (>10% cover). Arizona fescue is always present and has >15% cover. In two plots, the additional graminoids are threadleaf sedge (CAFI) or needleleaf sedge; in the other two plots the additional graminoids are pine needlegrass (ACPI2) or junegrass. Bitterbrush was always >10% cover, and sagebrush usually >25% cover (in one plot it was <5%).
- D** *Bitterbrush-big sagebrush-muttongrass* has total graminoid cover 50-65% and graminoid production 500-700 lb/ac/yr. Muttongrass is always present and >10% cover, often more. Either Arizona fescue or mountain muhly are prominent, >10% cover. Bitterbrush cover is usually >20% (always >10%), and sagebrush cover is variable.
- E** *Bitterbrush-big sagebrush-muttongrass-Arizona fescue* has total graminoid cover usually >45% (always >40%) and graminoid production usually 350-500 lb/ac/yr (always >300 lb/ac/yr). Muttongrass is always present; in two plots it is >20% cover, but in the other three, <10%. Arizona fescue is always present; its cover in two plots was >10%, but in the other three, <5%. Bitterbrush is usually >15% (always >10%), and sagebrush cover is variable.
- F** *Big sagebrush-bitterbrush-muttongrass-pine needlegrass* has total graminoid cover usually <40% (always <45%) and graminoid production usually <300 lb/ac/yr (always <350 lb/ac/yr). Either Arizona fescue or mountain muhly is present, but each is usually <15%, often <10%. Muttongrass is >10% cover in six of the fourteen plots. Bitterbrush cover was >15% in only two plots, 5-15% in seven, and <5% in five. Sagebrush cover was variable. In one plot, big sagebrush shared dominance with black sagebrush (ARNO4).



| Community Type | Elevation, ft Slope, % | Coarseness, % Depth, cm Mollic Depth, cm | Surface Coarse, % Bare, % Seral Stage | Cover, %: Trees Shrubs Graminoids Forbs | No. Species Total Live Cover, % TLC/NS, % | Prod. ¹ , lb/ac/yr Shrubs Gramin. Forbs |
|---|-------------------------------------|---|--|---|--|--|
| A. Big sagebrush-grasses- bitterbrush | 9,443 (9,130-9,600) 27.6 (13-36) | 74 (58-86) 115 (72-182) 38 (26-54) | 11 (2-19) 5 (2-7) LM | 0 (0-0) 42 (38-46) 113 (94-147) 27 (10-49) | 33 (29-37) 182 (150-216) 5.5 (5.2-5.8) | 227-433 1217-1441 85-411 |
| B. Bitterbrush-big sagebrush-grasses | 9,060 (8,860-9,360) 21.0 (11-27) | 70 (57-84) 37 (32-42) 10 (9-11) | 13 (9-17) 10 (1-18) LS | 0 (0-0) 52 (15-75) 77 (76-78) 8 (3-14) | 30 (28-33) 138 (98-167) 4.7 (3.0-6.0) | 22-1184 944-991 24-119 |
| C. Big sagebrush- bitterbrush-Arizona fescue | 8,973 (8,760-9,155) 19.6 (3-31) | 46 (11-70) 92 (77-106) 39 (36-41) | 12 (6-23) 16 (6-36) LM | 0 (0-0) 57 (30-80) 69 (67-70) 16 (3-30) | 36 (27-44) 142 (118-159) 4.1 (2.7-5.9) | 43-1277 783-840 29-262 |
| D. Bitterbrush-big sagebrush-muttongrass | 8,633 (8,050-9,200) 25.4 (12-50) | 75 (73-77) 50 (40-60) 20 (20-20) | 22 (11-40) 10 (4-21) LM | 0 (0-1) 52 (41-74) 57 (52-62) 7 (2-17) | 24 (12-45) 117 (101-140) 5.9 (2.7-10.2) | 306-1155 493-695 18-147 |
| E. Bitterbrush-big sagebrush-muttongrass- Arizona fescue | 8,620 (8,360-9,290) 24.8 (17-38) | 51 (36-81) 94 (60-130) 10 (3-20) | 42 (20-67) 23 (5-45) LM | 1 (0-2) 47 (33-65) 46 (43-49) 9 (3-18) | 32 (14-44) 104 (89-114) 4.1 (2.2-8.1) | 98-951 343-442 22-162 |
| F. Big sagebrush- bitterbrush-muttongrass- pine needlegrass | 8,659 (8,160-9,480) 15.6 (3-30) | 49 (18-80) 61 (38-130) 19 (0-30) | 33 (18-48) 21 (14-32) MS | 1 (0-2) 44 (22-72) 32 (12-44) 9 (2-21) | 27 (14-36) 85 (61-118) 3.4 (2.1-6.4) | 32-1115 56-347 13-188 |

| | SHRUBS | |
|--------|-----------------------------------|--------------------------|
| ARUV | Arctostaphylos uva-ursi | kinnikinnick |
| ARTR2 | Artemisia tridentata | big sagebrush |
| CHVI8 | Chrysothamnus viscidiflorus | Douglas rabbitbrush |
| PUTR2 | Purshia tridentata | antelope bitterbrush |
| | GRAMINOIDS | |
| ACLE9 | Achnatherum lettermanii | Letterman needlegrass |
| ACPI2 | Achnatherum pinetorum | pine needlegrass |
| CAREX | Carex | sedge |
| CAFO3 | Carex foenea | silvertop sedge |
| CAGE | Carex geophila | dryland sedge |
| CAOB4 | Carex obtusata | blunt sedge |
| CASTE3 | Carex stenophylla ssp. eleocharis | needleleaf sedge |
| CHGR15 | Chondrosum gracile | blue grama |
| ELEL5 | Elymus elymoides | bottlebrush squirreltail |
| FEAR2 | Festuca arizonica | Arizona fescue |
| FESA | Festuca saximontana | Rocky Mountain fescue |
| HECO26 | Hesperostipa comata | needle-and-thread |
| KOMA | Koeleria macrantha | prairie junegrass |
| LEKI2 | Leucopoa kingii | spike-fescue |
| MUMO | Muhlenbergia montana | mountain muhly |
| POA | Poa | bluegrass |
| POFE | Poa fendleriana | muttongrass |
| | FORBS | |
| ASDR3 | Astragalus drummondii | Drummond milkvetch |
| LUSE4 | Lupinus sericeus | silky lupine |
| PECA4 | Penstemon caespitosus | beardtongue |

